# OPTIMAL REINFORCEMENT PROPOSALS TOWARDS LOSS REDUCTION IN THE DISTRIBUTION NETWORK

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
in partial fulfillment of the requirements for the
degree of Master of Science
Registration No: 07/8425

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2010

# Abstract

Network losses represent a major cost in the delivery of electrical energy. As such they need to be carefully managed. Economic and environmental concerns compel a major focus of attention on any such waste of energy. A clear and accurate policy on loss evaluation and costing is required to ensure that limited capital resources are used to best advantage across the total power system. Distribution loss reduction is in many cases cheaper than commissioning generation plants and fuel for supplying losses over the life of a network. Distribution loss reduction requires a wide range of measures, such as: operations, design, major development projects and network reinforcements.

This study concentrates mainly on proposals for network reinforcements to the Medium voltage distribution system. It is a known fact that about two thirds of feeder losses arise in the first third of main feeder length. Re-conductoring or conversion of such sections can be extremely cost effective.

The objective of this study is to identify and formulate proposals for network reinforcement of the MY distribution system in order to:

(a) Operate at optimal level of losses
(b) Provide electricity in sufficient quantity and of acceptable quality
(c) Ensure efficient electricity distribution based on change of load
pattern of the large committed loads and general load growth.

This study has been carried out III the MY distribution network of the Western Province South-I of the Ceylon Electricity Board. SynerGEE computer software has been used to formulate the load flow study. The software model calculates the annual network energy and peak power demand forecast. Required reports and charts generated using the load flow with profile analysis. Load forecast is the primary factor for formulation of network reinforcement proposals. The reinforcement

proposals have been obtained for the years from 2009 to 2013 based on provincial requirement on bottom up approach.

The implementations of network reinforcement proposals incur substantial costs to the utility. With a view to lessen the burden on the utility, the network proposals have been spread throughout the planning period in such a manner that those are implemented exactly as and when necessary. This in turn stagger the investment and helps smooth cash flow. Economic evaluation has been carried out to asses the costs and benefits of the proposed investment. Calculations have been done based on data obtained from the load flow. Results of the economic evaluation of this study are satisfactory. However the performance figures are based on the load forecast and timely implementation of the proposals as scheduled.

Benefits are two folds; quantifiable and unquantifiable. Benefits from improvement of network voltage and supply reliability are difficult to quantify. The readily quantifiable benefit is the reduction of power and energy losses. Only this benefit has been considered for the analysis.

The techniques describes in this study allow a loss reduction strategy to be formulated, based on experience of a typical segment of the network under consideration. For planning purpose, the results of a well chosen pilot scheme can be applied to the entire network; thus allowing the total cost of the scheme and the resulting benefits to be evaluated.

Distribution system loss reduction presents an excellent opportunity for improved energy efficiency. Loss evaluation both difficult and complex. Development of policy and programme require both technical and judgemental analysis. This study summarizes approachesto reduce losses in power distribution systems.